

Holistic Interactions of Shallow Clouds, Aerosols, and Land-Ecosystem (HI-SCALE) Campaign

Phase 1: April 24 – May 20

Phase 2: Aug 28 – Sept 23



CVI inlet for analysis of cloud droplet residuals

meteorology

fast-response temperature and humidity

radiation

cloud properties

CCN (cloud condensation nuclei)

aerosol number and size distribution (2 CPC, UHSAS, PCASP, CAS)

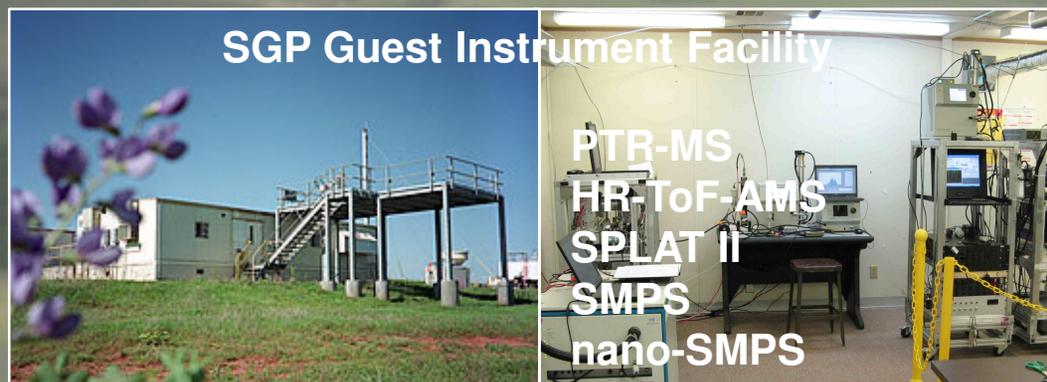
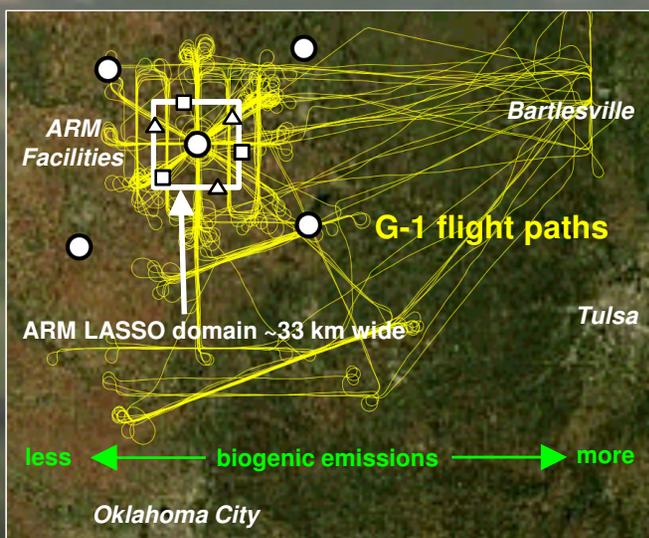
FIMS (aerosol size distribution, 10 – 400 nm)

HR-ToF-AMS (aerosol composition)

miniSPLAT (single particle characterization)

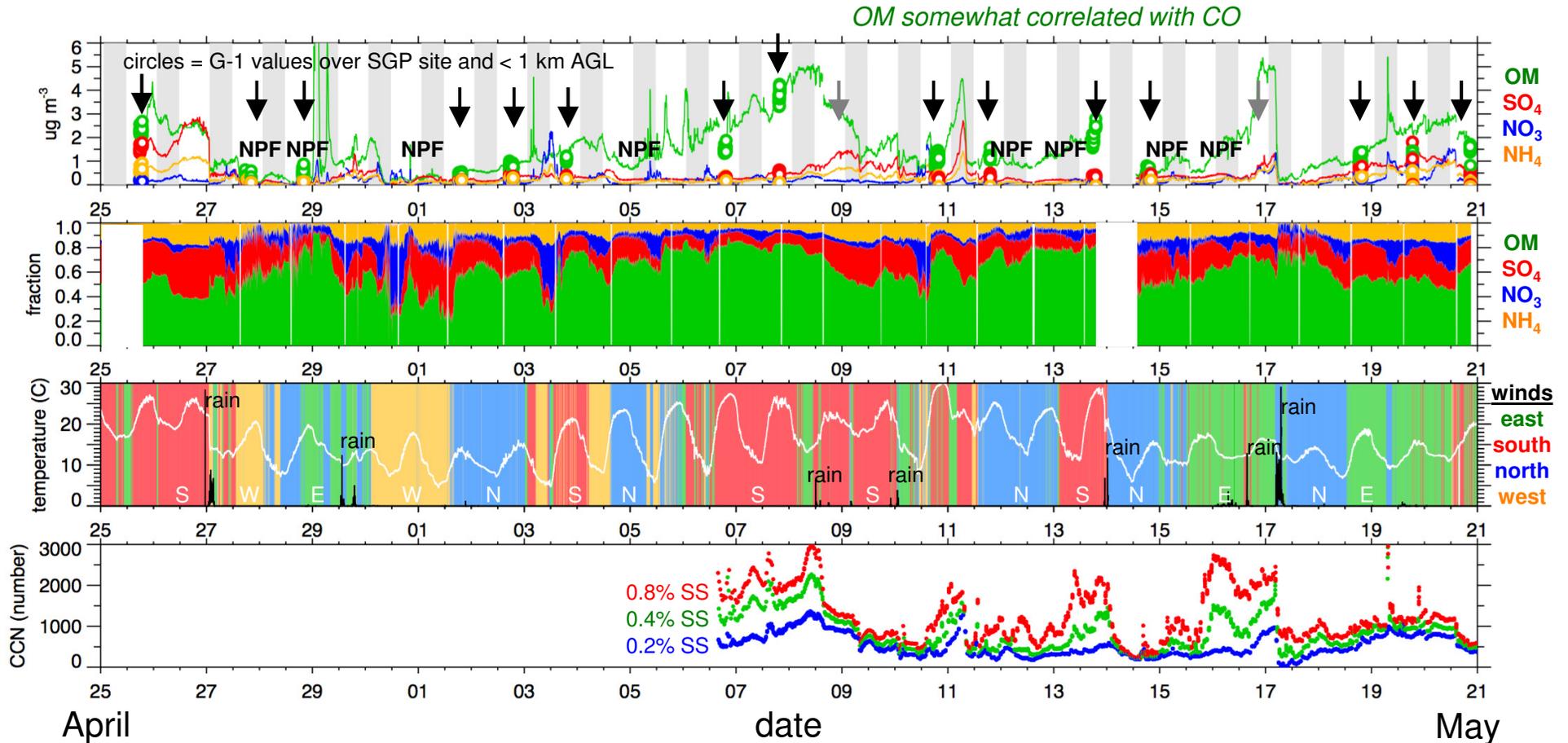
NO, NO₂, SO₂, CO, O₃

CIMS (volatile organic compounds)



Phase 2 Only: TDCIMS (nanoparticle composition)
Cluster CIMS (inorganic and organic acids and HOMs),
Amine CIMS, Amp-MS

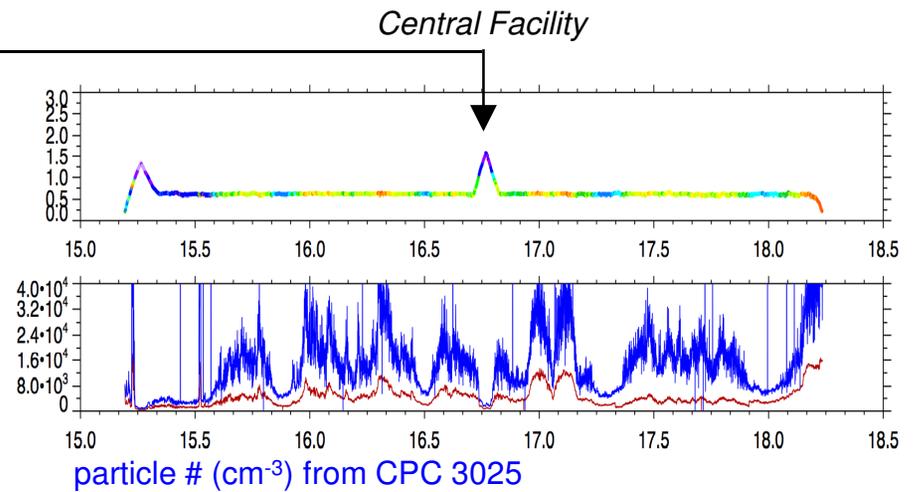
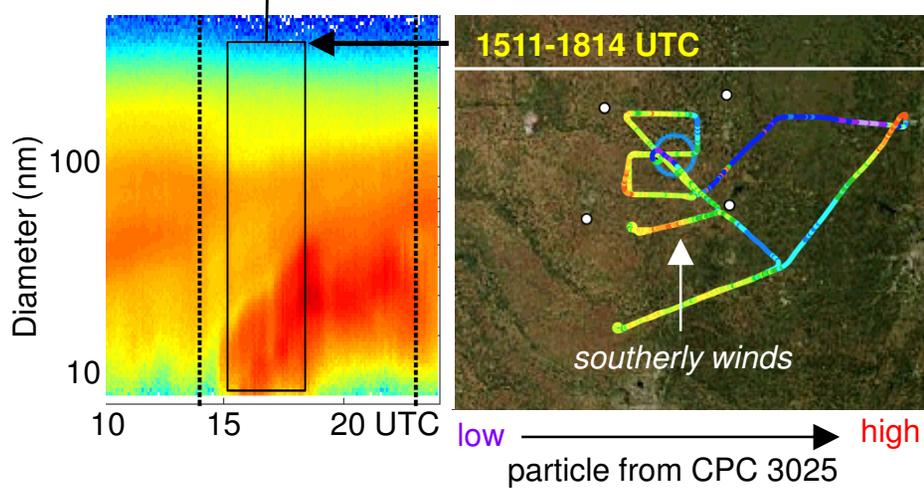
Aerosol Variations during Phase 1



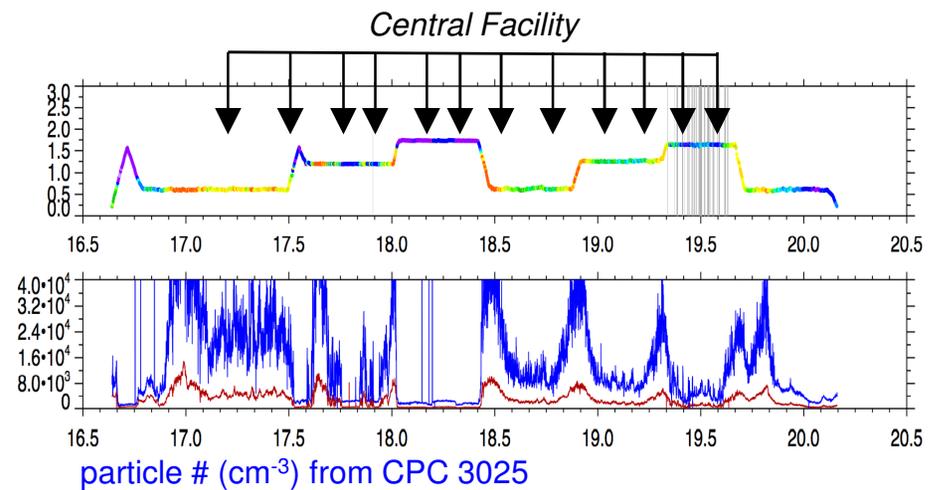
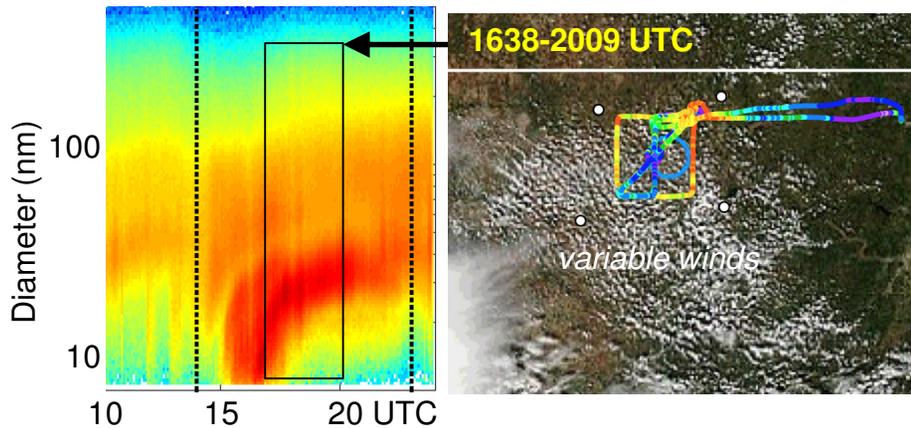
- ▶ Organics are the dominate component, but there are periods where inorganics are 50% of total mass
- ▶ CCN is somewhat correlated with aerosol mass as expected, but need to account for changes in size distribution and hygroscopicity.

New Particle Formation

September 11



September 17



Aerosol Science That Can Be Addressed

- ▶ **New Particle Formation and Growth:** Does NPF occur at the surface or aloft? What are the mechanisms driving NPF? What processes are controlling the growth of nanoparticles to sizes relevant to CCN and optical properties?
- ▶ **Secondary Organic Aerosol:** What are the chemical mechanisms responsible for biogenic SOA? How does anthropogenic sources alter biogenic SOA? How do clouds affect organic aerosols via aqueous chemistry?
- ▶ **Model Evaluation and Improvement:** How well do state-of-the-science models represent NPF, SOA, and particle growth in the vicinity of the SGP site? What are the effects of photochemistry, vertical mixing, and long-range transport?

